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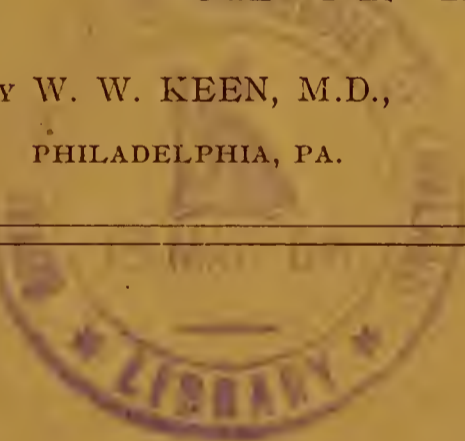
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# SURGERY OF TYPHOID FEVER.

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PHILADELPHIA, PA.






# Surgery of Typhoid Fever.







## The Surgery of Typhoid Fever.

By W. W. KEEN, M D.,

PHILADELPHIA, PA.

*An Address*

*Delivered before the Medical Society of City Hospital Alumni,  
June 30, 1904.*

MR. PRESIDENT AND GENTLEMEN:—When you kindly invited me to address you I was obliged to excuse myself on account of numerous other existing engagements, and when you still pressed the request I accepted with the statement that it would be impossible for me to take time to prepare a carefully written paper, but if you thought a few *ex tempore* remarks upon the Surgery of Typhoid Fever, would be useful, I would gladly meet your wishes. I must ask, therefore, for your indulgence if both in matter and manner I fall far short of what I would wish. I have not had time to tabulate the many cases reported since my book on “The Surgical Complications and Sequels of Typhoid Fever” was published early in 1898, and, therefore, have had to quote statistics of that date except in a few cases. Saving, however, in typhoid perforation, I suspect that while numbers might vary, the percentages would be much the same.

My attention was called to this subject as early as 1874 by some cases I had had. In my Toner Lecture, in 1876, I gave a brief résumé of our then existing knowledge on the subject. Afterward, in 1898, as already stated, I published a little monograph on the Surgery of Typhoid, covering the ground more completely. It is a striking fact that in the years that have elapsed since 1897 there should have been so many cases reported compared with the number previously reported. My book published in 1898 covers practically the records of typhoid surgery for about fifty years. The number

of cases in that period was 1700. I think since 1898 I have notes of perhaps 1000 additional cases.

One must remember that there are many more deaths from the complications of typhoid than from the fever itself. Hölscher, in a study of 2000 fatal cases, found that 24 per cent died of the fever and 76 per cent of the complications and sequels.

In 1876 when my Toner Lecture was delivered, the bacillus was not known. Moreover, even in 1898 the pyogenic faculty of the typhoid bacillus was still in doubt, though now it is a well-recognized fact. The viability of the bacillus in the body is something extraordinary, especially in the bone marrow, the spleen and the bile. Thus, Sultan found the typhoid bacillus in an open sinus from the clavicle after six years; Buschke, in the rib, after seven years; von Dungern, in the bile, after fourteen and a half years; Droba, in the bile, after seventeen years, and Hunner, in the bile, eighteen years after the attack of typhoid, all in pure culture.

Not seldom the bacilli are found in many organs in the same patient, showing their very wide distribution. Thus, in one of his patients, Flexner found them in the mesenteric glands, the spleen, the liver, the bile, the kidneys, the lungs, the bone marrow and the blood of the heart. As a matter of fact, I advocated in 1898 the view that these wide-spread infections indicated unerringly the diffusion through the blood, although I could show then but few cases in which the bacilli had been cultivated from the blood. In the past few years the bacilli have been found in many cases, in the blood in 80 per cent of the cases examined, especially in the early stages. This, therefore, may prove to be one of the very earliest means of diagnosing typhoid fever as well as of explaining its multiple invasions. Moreover, as in cases of abortion, the typhoid bacillus has been found in the placenta and the fetus,—no other means of such infection could be imagined than by the blood.

One of the most important complications to be considered is *gangrene*, the result of thrombosis. It is generally a late complication or early sequel, arising usually from the second week to the seventh, chiefly in the second and third weeks.

The cause of the thrombosis is not only the weakened heart and the weakened and sluggish circulation, but the bacilli themselves existing in the blood, the heart and the walls of the arteries and veins. If a thrombus forms in an artery it causes a dry gangrene through cutting off of the blood supply; if in a vein moist gangrene through damming up the blood supply.

Occasionally the gangrene is bilateral. It is far more frequent in the lower parts of the body than in the upper, *i.e.*, where the force of the circulation is the least. Out of 214 cases it appeared 146 times in the genitals and the legs. The same preponderance is seen in the joints in the proportion of 70 to 17, and in the bones 112 cases in the lower extremities to 41 in the upper.

Curiously enough Ricketts has shown in his recent paper that it is much more common in men (100 cases) than in women (34 cases).

The most remarkable case of gangrene I ever saw I will describe briefly, because it is of more than usual interest, inasmuch as it shows the possibility of using the rectum for many years as a common cloaca. A woman, aged 34 years, in March, 1872, was ill of typhoid following prolonged nursing of her husband who died of typhoid. Gangrene of the vagina caused both rectovaginal and vesicovaginal fistulæ, which a colleague had not been able to close. I, in turn, was equally unsuccessful in my efforts to close them. After thirteen operations by him and myself, covering about two years, the woman was cured in this way: After the operation and consequences had been fully explained to her and her ready assent given, the urethra was excised and the vulva entirely closed. All the urine, all the menstrual discharge—which continued for a few years after the thirteenth operation (a lucky number for her), and also all the feces, were passed per rectum. In December, 1888, twelve years after the operation, she came to me for the first time, complaining of difficulty in urination. I found that a little round calculus had formed in the vagina and was acting as a ball-valve and causing retention of the urine. On crushing and removing this through the rectovaginal opening she was entirely relieved. I

saw her last in November, 1898. For twenty-two years the rectum had served as a common cloaca without irritation of the rectum or infection of the kidneys. She told me that she rose only once or twice during the night to urinate and that she had been perfectly clean and comfortable all these years.

As to the prevention of typhoid gangrene, it is practically impossible either to foresee or to forestall it. When it occurs all we can do is to keep the parts as clean as possible and, finally, after the line of demarcation has formed, to amputate the extremity or excise the slough. Here I would suggest neural infiltration in preference to general anesthesia, especially if the operation has to be done during the course of the fever. Ricketts' statistics seem to show that operation is imperative, for in 87 cases operated upon there were 22 deaths, a mortality of 25 per cent, while in 35 cases not operated upon there were 34 deaths, a mortality of 97 per cent—a most startling contrast. But I suspect it is somewhat misleading in one respect. In many of the cases not operated upon the gangrene was doubtless so extensive and the patient's condition so grave as to forbid any operation whatever. In the remaining suitable cases the results are so encouraging that in doubtful cases we should give the patient the benefit of the doubt.

In every case of typhoid infection of the *joints*, let me urge especially that you take the opportunity to examine the fluid bacteriologically. With modern methods I hope we shall be able to detect the typhoid bacillus in pure culture; but there has been no case up to the present time, so far as I remember, in which the typhoid bacillus has been proved to exist in the joints, though unquestionably the post-typhoidal joint infection must be the result of the bacillus.

The most unexpected result of the joint affections of typhoid is dislocation of the hip, due to distention of the capsule with fluid. I have seen personally three cases of this lesion but unfortunately long after the fever, when it was too late to do anything. It is distinctly a complication of childhood and early youth. Of 38 cases 35 were under the age of 20 years. Most of these cases have only been discovered by the doctor after they have occurred, since, as a rule, no pre-



monitory symptoms have been observed. The child has typhoid and is lifted by the doctor or the nurse from the bed when suddenly one of the hips is dislocated; or the child may complain of pain, and upon examination the hip is found already dislocated—no one knows when or how.

The lesson is clear. Examine the hips in young patients with care, especially if there is the least complaint of pain. I say the *least* complaint of pain, because in most of these typhoid patients their apathy and indifference to any except considerable pain may very possibly make the physician disregard slight complaints, only to find later the grave error into which he has fallen by want of attention to such slight complaints. If a dislocation occurs, immediately replace it and guard against its recurrence.

Affections of the *bones* are, as a rule, a late sequel rather than a complication; they are relatively frequent. I found on record up to 1898, 237 cases. The bacillus of typhoid has been found in pure culture many times, not only in the long bones but in the diffused marrow of the spongy bones, because in the bone marrow the infection is the most frequent and lasts the longest after the fever has passed. In fact, it is probable that the marrow of most of the bones, including even the vertebræ, is infected at one time or another during most cases of typhoid.

There is a marked difference between a typhoid infection and an ordinary pyogenic infection of the bones. When there is a pyogenic infection the patient is distinctly sick, often, indeed, *very ill*. He has high fever and complains of severe pain. These symptoms are absent or slight, as a rule, in typhoid infection. In many cases there is little or no fever, and only at the point of infection may there be tenderness. Another thing which sharply differentiates typhoid bone disease from similar pyogenic diseases is the fluctuations in the local manifestations. A lump will appear, be a little red and tender and then will subside, only to reappear at a later period. I have known such a rise and subsidence to occur five or six times in the same case.<sup>1</sup> Moreover, typhoid infections of the bones are apt to continue for years and to attack successively different bones. In one case I had under my care the attacks

covered a period of eight years, and may have continued much longer for I then lost sight of him. In this patient's case his occupation required hammering with a large sledge hammer, and in consequence he had multiple attacks in the arm, forearm, leg and thigh, especially on the right side, on which came the strain of his occupation. The most frequent results of such an affection are a periostitis or an osteomyelitis, the latter being on the whole, I think, the most frequent.

The osseous lesions of typhoid as we would naturally expect are very widely distributed but preponderate in the lower extremities. In the head there were 14 cases, in the trunk 49, in the upper extremities 41, in all 104; whereas, in the lower extremities, there were 112 cases, more than in all the other parts of the body combined. Sir James Paget long ago called attention to typhoid periostitis (osteomyelitis, I believe, almost invariably) of the ribs and sternum. The date at which the infection occurred will show you that it is a late sequel. The disease arose in 16 cases in the first two weeks, from three to five weeks in 66 cases, from months to years after the fever in 104 cases.

The treatment is very clear and simple, namely, removal of all the diseased tissue. You will find in a great number of cases, especially in your earlier cases, before you are taught by disagreeable experience, that you will fail to cure your patients by the first operation because you do not go wide enough. If the infection is in a rib, for instance, we must take out the entire thickness of the rib and go far from the disease forward and backward. I have had to do two, three or four operations in some of my early cases because I did not remove enough. Considering the origin and extent of the operation it is not a very dangerous one—only 11 out of 168 cases proved fatal.

When the infection invades the *larynx* it is most frequently during convalescence, usually from the fourth to the eighth week (83 out of 143 cases). I found 221 cases up to 1898. I well remember during the Civil War two cases of typhoid in which within forty-eight hours of each other I had to do instantaneous tracheotomy, but unfortunately without saving the life of either patient. The age is important, the patients are chiefly from 15 to 25 years of age (109 to 56

for all other age). After the age of 25 years, laryngeal complications are rare; before the age of 15 years, they are *very* rare. Very frequently the laryngeal symptoms will be slight, but if you find in any typhoid patient that there is even a slight hoarseness or dyspnea, instant and close attention should be given to the case, for there may be a sudden change for the worse, a livid face, bloody expectoration and almost instantaneous suffocation. Of 98 cases not operated upon, 77 died and only 21 recovered, a mortality of 78.6 per cent, while of 99 cases operated upon, 55 died and 44 recovered, a mortality of only 55.5 per cent. The most dangerous of all forms of laryngeal typhoid disease is necrosis of the laryngeal cartilages. In these cases death followed in 95 per cent of all the cases.

The only treatment is early tracheotomy, and in many cases an instantaneous one. Tracheotomy is the operation not only of choice but of necessity. Intubation is not to be considered.

I now come to a complication of the greatest interest both medically and surgically, which will appeal to all of you, namely, *intestinal perforation*. Operation in these cases was first advocated by Dr. James C. Wilson. I remember the first case he had in which, though we did not operate, we were ready to do so. He asked me late in the afternoon to go and see a patient with him. This was in 1886, two years after Mikulicz's first, and up to that time, the only operation, which, however, had not then been published. We could not quite make up our minds that there was a perforation, and so finally decided to wait until the next day. She was then a little better, and each following day there was some improvement until she finally recovered without operation. But this case soon led to the first published plea by Prof. Wilson for operation in case of perforation.

Perforation bears no relation to the severity of the fever, and, in fact, it is not uncommon in the ambulant type of the disease. Taylor states, that based upon the Census and the Marine Hospital Reports on the frequency of typhoid in the United States, we have about 500,000 cases a year with a mortality of about 50,000. Osler attributes about 30 per cent of

the mortality to perforation. If this is so, there are annually about 15,000 deaths in this country due to perforation. On an average we can now save 30 per cent of these cases of perforation, which would mean 4,500 lives saved annually. In their recent paper, Harte and Ashhurst collected from January, 1898, to December 31, 1903 (the six years following my monograph), only 201 cases operated upon the world over. Yet, it would seem that in these six years in the United States alone 90,000 patients died from typhoid perforation, nearly all of whom should have been operated upon and about 27,000 lives saved. Have I not reason then to select the topic of the evening when it is so evident—so painfully evident, that the profession at large have not even begun to appreciate the need for operation in typhoid perforation? It is especially the family physician, the one who attends typhoid fever, rather than the surgeon, who needs to be taught that perforation means operation, as a rule, just as he has painfully learned that, as a rule, appendicitis means operation. Iteration and reiteration are needful, here a little and there a great deal, and in time the profession will be convinced, but only, I fear, after the loss of many valuable lives.

The site of perforation is most commonly in the ileum, though it appears also in the appendix and cecum, and in the opposite iliac fossa, in the sigmoid. Moreover, there are sometimes two, three or even four perforations or impending perforations which later may go on successively to complete perforation. Hence the need in every case in which operation is done is to examine several feet of the intestine for other impending perforations to see that they are closed and sealed up in advance of perforation. There are on record a number of cases in which the patients have been operated upon for perforation and in full tide of recovery who have died of a later perforation. Most of these could have been prevented had the impending perforation been sealed by a few sutures.

As to diagnosis, the symptoms are sometimes sudden and severe. There may be marked shock and pain. On the other hand, there is slight or no shock in most cases. There is almost always pain, but often not so severe as to produce any shock. There will sometimes be nausea and vomiting. Rigid-

ity of the abdominal wall is sometime present but not always. There is sometimes a slight fall in temperature. Hepatic dullness rarely disappears. The perforations are not usually so large as to allow of the escape of gas in large quantities into the peritoneal cavity. Leukocytosis I believe to be of great value. During the fever itself there is, as a rule, no leukocytosis, sometimes even in perforation there is none. But if there is pain, a fall in temperature, a rise in leukocytes to 15,000, 20,000 and sometimes even 50,000, then you ought to conclude that there is perforation and that operation should be undertaken as quickly as possible. When perforation has gone on long enough to give rise to peritonitis, then you will have also a rise in the blood pressure and there will be a hard, quick pulse.

When I wrote my monograph in 1897, I took a much less hopeful view of operation in these cases than I do now. Up to that time I could collect only 83 cases, with a mortality of 80.7 per cent. In view of the disease, itself a most serious and dangerous malady, and of the high mortality, I was of the opinion that the outlook was rather gloomy. But cases since reported by Finney, Cushing and others have shown that such patients bear operation unexpectedly well.

In 1898 and 1899 I collected 73 additional cases of operation and the mortality had fallen from nearly 81 to 72 per cent. Harte and Ashhurst have recently collected 362 cases to the end of 1903. Arranged by periods of five years there were:

From 1884 to 1888, 10 cases, with a mortality of 90 %.

From 1889 to 1893, 16 cases, with a mortality of 87.5 %.

From 1894 to 1898, 100 cases, with a mortality of 72 %.

From 1899 to 1903, 106 cases, with a mortality of 69.2 %.

This progressive fall in the mortality from 90 per cent to 69.2 per cent is most encouraging. Instead of 30.8 per cent of recoveries which is the average result for all surgeons, individual operators, under exceptional hospital advantages, have had a much higher rate of recovery. But surgeons, as a rule, should anticipate for the future recovery in at least one case out of three, and I believe it will gradually rise to 40 or 45 and possibly to 50 per cent, though from saving one in three to saving one in two is a long step. Undoubtly, also, the *published* cases

do not fairly represent the *actual* cases, for many unfavorable cases slumber—and very possibly always will slumber, in sealed case-books or unpublished memories.

The time at which operation is done after perforation is of great importance. In the first twelve hours, according to Harte and Ashhurst's recorded cases, the mortality is 73 per cent, during the second twelve hours it is 73.8 per cent, while in the third twelve hours it rises to 93.5 per cent. The fact that after this time there is a fall in the mortality to 67.2 per cent is no argument for postponing the operation, because most of the patients would be dead before you could operate on them. These later statistics confirm those published in my book. My position in that publication has been misunderstood. It has even been said that I *preferred* to wait until the second twelve hours, an utterly untenable position in the face of a spreading infection. What I stated was that so far as we could judge by the statistics then available (1897), the second twelve hours showed a less mortality than the first twelve hours. The later and fuller statistics of Harte and Ashhurst show that the mortality of the first and that of the second twelve hours are now practically the same. Moreover, in my book I *urged* as prompt operation as possible with two provisos: First, as advised by Abbe, that we should not so hasten operation as to be handicapped by want of suitable provision for light, means of flushing and sufficient assistants; and secondly, that if profound shock were present we should wait a reasonable time to see whether it would pass off.

Of course, I refer here only to any primary shock that may immediately follow the perforation and, therefore, be due very largely to severe pain and not to the later-delayed shock which may arise from absorption and infection. The latter form of shock could not occur immediately after operation, and therefore could not be taken into consideration when deciding whether operation should be done immediately.

Happily the spread of modern hospitals even in small towns provides for the first condition in a large number of cases. As to the second, I must still adhere to the view which is the admitted rule of practice in other surgical cases. When a limb is smashed in a railway accident, if there be little or no

shock, immediate operation is proper. But if there be profound shock, a cold, clammy skin, a hardly-perceptible pulse, a sighing respiration, where is the wise, sensible surgeon who would not delay operation for a reasonable time in spite of the danger, here also, of an hourly increasing infection? If after a while it is evident that the patient's condition is not improving, then in spite of the shock he must operate. So in typhoid perforation, if there is little or no shock—as is the rule in the majority of cases, then the earlier the operation can be done the better, as I said in 1898. But if there be profound shock, I still believe that a judicious surgeon will wait but only for a reasonable time. The increasing infection in this short space of time will be more than counterbalanced, in my opinion, in the majority of cases by the decreasing danger from operating during severe shock, if it exists. Were this not so, the second twelve hours, as we may conclude now from 362 cases, should show a *large* increase in its mortality instead of an increase of only 8/10 of 1 per cent over the first twelve hour period.

As to the technic of the operation my judgment is that in most cases a general anesthetic will be required. Patients frequently complain severely of pain upon opening the abdomen under a local anesthetic. The incision should be long enough not to embarrass the surgeon, yet so short that he can close it quickly and leave no chance of hernia.

If the perforation is a small one it should be closed, without trimming the edges, with Lembert sutures. If it is very large your choice must lie between a resection with an end-to-end anastomosis, and an artificial anus. The artificial anus is so much more safely and quickly made that this should be the operation of choice in most cases. This will of itself diminish largely the future mortality rate. When the patient recovers a secondary operation to re-establish the continuity of the intestine may be performed. In all such cases a search should be made to discover impending perforations and to prevent them by Lembert sutures.

Perforation of the *gall-bladder* is not a frequent complication. Up to 1898 there had been reported only four perforations of the gall-bladder treated by abdominal section result-

ing in the cure of three of the cases—a recovery rate of 75 per cent.

I have not time to consider the other complications of typhoid, but can only mention the brain, eye, ear, thyroid, gland and a few cases of stricture of the esophagus. Pleurisy and empyema are not at all uncommon. Perforation of the stomach occasionally takes place. There is occasionally inflammation of the spleen, softening of the mesenteric glands, which may resemble perforation. Suppuration of an existing ovarian dermoid is infrequent, but five or six cases have been reported, and a pure culture of typhoid bacillus has been found. Abortion is not uncommon, the placenta and the fetus both showing the bacillus in pure culture. The male genitourinary organs are occasionally affected, most frequently with orchitis and occasionally a cystitis. Abscesses of the muscles are not uncommon. Scarcely an organ of the body escapes the malign influence of the fever.

Now that we are awakened to the wide spread and frequent surgical dangers that may arise in nearly every organ and portion of the body—dangers which can be discovered and mitigated, or sometimes even averted by timely means—the future should show far better results, especially in intestinal perforation, than the past.

<sup>1</sup>[NOTE.—After this address was delivered, during my summer holiday, I saw in consultation with Dr. C. P. Thomas, in Spokane, a very unusual case which illustrates exactly the points here made. The peculiar symptomatology enabled us to reach a correct etiology and diagnosis. Although the case was not one of affection of the bone, as at first thought probable, the same peculiarities of late typhoid infection were well illustrated.

A woman, aged 34 years, about January 1, 1904, began to complain of pain in the region of the sacro-iliac joint. The pain was never severe, and came and went. About April 1st, a swelling appeared in the same region. This also came and went, increased and decreased, almost to the point of disappearance. Finally, by July it increased considerably in size, became red and at last ruptured, discharging considerable pus.



Meantime there had been no fever, no loss of appetite or sleep, and, therefore, no loss of weight.

In view of this peculiar history and the absence of systemic symptoms, which would have been very marked if it had been an ordinary pyogenic abscess, I asked the woman if she had ever had typhoid fever. She immediately stated that she had had a prolonged attack in the preceding September and October.

On examination I found two openings nearly in the crease between the buttocks over the lower part of the sacrum. A probe showed that the skin was separated from the underlying tissues down to the tip of the coccyx and upward and to the right as far as the middle of the crest of the ilium. I presumed that there was probably diseased bone at the bottom of the trouble. On operation, however, I found that the external abscess communicated with the interior of the pelvis through the great sacrosciatic foramen, and on investigation of the interior of the pelvis, I found that there was no diseased bone, but that a large abscess had formed in the connective tissue between the anterior surface of the sacrum and coccyx and the rectum. Instead of discharging through either the rectum, vagina or bladder, as would ordinarily have been the case, it had made its egress through the great sacrosciatic foramen and finally ulcerated its way through the skin. Of course, there may have been a typhoid periostitis or osteomyelitis and any fragment of bone have been discharged when the abscess ruptured, but I was not able to discover any evidence of such osseous disease. Moreover, the prompt recovery of the patient after thorough curetting and temporary packing with iodoform gauze seems to indicate that the disease did not involve the bone.

The sharp contrast between the mild constitutional course of such a typhoid infection and the severe constitutional symptoms which would have attended an ordinary pyogenic infection, and the increase and decrease in swelling and pain were most instructive features of the case.]

